

### REMARKS/ARGUMENTS

Claims 2-3, 10-13, 15-16, 18-19 and 27-31 are resubmitted in original form. Claim 65 is resubmitted in previously presented form. Claims 1, 4, 7, 9, 17, 26, 32 and 64 are amended. Claims 5-6, 8, 14, 20-25, 33-63 and 66 are canceled without prejudice or disclaimer of subject matter. No new claims are added. Accordingly claims 1-4, 7, 9-13, 15-19, 26-32 and 64-65 will be pending upon entry of the above amendment.

Claims 17, 28, 32 and 64 were rejected under 35 U.S.C. 112 as being indefinite and for failing to particularly point out and distinctly claim the invention. Claims 1-6, 8, 13, 15-19 and 64 were rejected under 35 U.S.C. 102(b) as being anticipated by Say et al. (US 6,603,343). Claims 7 and 10-12 were rejected under 35 U.S.C. 103(a) as being unpatentable over Say et al. and Applicant's Admission. Claim 9 was rejected under 35 U.S.C. 103(a) as being unpatentable over Say et al. in view of Ogata et al. (US 6,531,100). Claims 1, 14, 26-28 and 30-32 were rejected under 35 U.S.C. 103(a) as being unpatentable over Mirowsky et al. (US Patent Application no. 2003/0150222) in view of Say et al. Claim 65 was rejected under 35 U.S.C. 103(a) as being unpatentable over Say et al.

#### Claim Amendments

Independent claim 1 is amended to define a system "wherein [a] first adsorbent unit is adapted to reversibly adsorb said pollutant from said air stream at a first concentration of said pollutant; wherein said first adsorbent unit is further adapted to desorb said pollutant into said air stream at a second concentration of said pollutant; wherein [a] second adsorbent unit is adapted to adsorb said pollutant from said air stream at a second concentration of the

pollutant; wherein [a] second photocatalytic oxidation unit is located downstream from said second adsorbent unit; and wherein the second photocatalytic oxidation unit is contiguous with ... interior air space". These features are described in the originally filed specification in paragraphs [0068] [0086] and Figures 3, 6C and 8.

Independent claim 26 is amended to define a vehicle wherein " an adsorbent unit and [a] photocatalytic oxidation unit [are] arranged within a housing, said housing defining a single flow path for an air stream, said photocatalytic oxidation unit arranged orthogonal to said air stream",

These features are described in the originally filed specification in paragraph [0059], [0065], and originally filed claim 43.

Claims 4, 7, 9 and 17 are amended to conform to amendments of claim 1. Claim 32 is amended to define an ECS as an "environmental control system". Claim 64 is amended to correct an antecedent issue by changing a term "said metal support" to "a metal support".

#### Examiner Interview

Applicant thanks the Examiner for his time and willingness to discuss this pending matter. A telephone interview was conducted with the Examiner on September 22, 2007 to discuss the rejection of the claims as made in the outstanding Office Action. Applicants proposed amending the independent claims to include definitions of features of original claims 6, 7 and 8 and further that a second absorber unit would not be defined to embody an irreversible adsorbent. This claimed arrangement would provide a photocatalytic unit as a final unit of a collection of units. It would provide for an extended life of an air

cleaning system because a penultimate absorber unit could perform reversible adsorption and would therefore not need periodic replacement. The Examiner acknowledged that these changes would partially overcome the cited references, but that a remaining issue is that these proposed changes would still not distinguish over a disclosure (in Say et al.) of employing multiple cleaning units in series. If additional limiting language were to be directed to this last point, the Examiner tentatively concurred that such re-defined claims may be allowable.

#### Claim Rejections – 35 USC 112

The Examiner rejected claims 17, 28 and 64 because some terms lacked an antecedent basis. In the case of now amended claim 17, the terms “photocatalytic oxidation unit” and “adsorbent unit” are referred as “first photocatalytic unit” and “first absorber unit”. This makes the terms consistent with their description in amended claim 1 on which claim 7 is dependent. In the case of claim 28, the term “said second photocatalytic oxidation unit” is provided with an antecedent because of an amendment of claim 26 on which claim 28 is dependent. In the case of now amended claim 64 a term “said metal support” has been changed to “a metal support”.

Claim 32 was rejected because a term “ECS” was insufficiently definite. Applicant has followed the Examiner’s suggestion and amended claim 32 to recite an “environmental control system (ECS).

For the above reasons, Applicant respectfully submits that claims 7, 28, 32 and 64 are now in compliance with 35 U.S.C. 112. Reconsideration and withdrawal of the rejection of claims 7, 28, 32 and 64 under 35 U.S.C. 112 is requested.

Say et al. (US 6,603,343)

Say et al. discloses a photocatalytic fluid purification system which may embody a so-called adsorbent “buffer” positioned upstream from photocatalytic units. Say et al. also discloses that there may some advantage to using a post-filter downstream from the catalytic units. A possible configuration for the post-filter is described as an “adsorbent bed” adapted to perform a final capture role. Subassemblies of the system may be collectively installed in parallel or series so that they can be easily replaced as needed.

While Say et al. does disclose a possible presence of adsorbent units on an upstream and a downstream side of a photocatalytic unit, it does not disclose a photocatalytic unit on a downstream side of the second adsorbent unit. Furthermore Say et al. does not disclose a combination of purification elements in which a final element is a photocatalytic unit. In that regard, Say et al. fails to disclose a structure in which a final absorber unit may perform reversible adsorption. Indeed the post-filter of Say et al., if it performs adsorption at all, must perform the adsorption *irreversibly*. If the Say et al. adsorption were performed reversibly, contamination products would emerge from the purification unit.

Claim 1, as amended, defines an entirely different structure. Claim 1 defines a structure in which a “second photocatalytic oxidation unit is contiguous with [an] an interior space” to which clean air is provided. In that regard, claim 1 defines an unobvious distinction from the Say et al. disclosure. In the structure of claim 1, a “the second photocatalytic oxidation unit is located downstream from [a] second adsorbent unit”. Consequently the second adsorbent unit may be permitted to perform *reversible* adsorption. Desorbed

pollutants from the second adsorbent unit may be captured by the downstream second photocatalytic oxidation unit. The entire system of claim 1 may experience an extended life because the all of the absorber units of the system may be permitted to perform reversible adsorption.

Claim 26 also defines a structure in which “[a] first adsorbent unit, [a] photocatalytic oxidation unit, and [a] second adsorbent unit [are] arranged within a housing, said housing defining a single flow path for an air stream said photocatalytic oxidation unit arranged **orthogonal** to said air stream”. Such a structure is not disclosed in Say et al. Indeed Say et al. discloses a structure in which air flow is **parallel** to a photocatalytic unit.

Furthermore, claim 1 defines that “[a] first adsorbent unit includ[es] a first adsorbent material having a first isotherm curve for [a] pollutant [and a] second adsorbent unit includ[es] a second adsorbent material having a second isotherm curve for said pollutant, steeper than said first isotherm curve”. Say et al, does not teach or suggest use of multiple adsorbent materials with progressively steeper isotherm curves.

For the above reasons, Applicant respectfully submits that Say et al. does not teach or fairly suggest the subject matter of claims 1 and 26 nor any of the claims that dependent on claims 1 and 26. Reconsideration and withdrawal of the rejection of claims 1-4, 13, 15-19 and 64 under 35 U.S.C. 102(b) and claims 1, 7, 9-12, 26-28, 30-32 and 65 under 35 U.S.C. 103(a) based on Say et al. is requested.

### Applicant's Admissions

In citing Applicants' Admissions (page 21, lines 12-30) against claims 7, 10-12 and 29, the Examiner asserts that the Applicant has admitted that "selecting the appropriate adsorbent material for an adsorbent unit is a matter of design choice". But it must be noted that, in making the cited disclosure, Applicant has merely stated that varying operating conditions, expected pollution concentrations and the like may dictate some material choices for components of an adsorbent unit.

Claim 7 does not define particular materials or isotherm curves but rather a relationship between relative steepness of isotherm curves for materials of successive absorber units. Claim defines that "[a] second isotherm curve [for a second unit] is steeper than [a] first isotherm curve [for a first unit]". Applicant submits that the cited disclosure does not teach the principle of the invention defined in claim 7.

As to claims 10-12 as well as claim 7, Applicant respectfully asserts that these claims are dependent on amended claim 1 which, as described above, is not anticipated or suggested by the prior art. Similarly, claim 29 is dependent on amended claim 26 and is therefore not anticipated or suggested by the prior art.

For the above reasons, Applicant respectfully submits that Applicant's Admission does not teach or fairly suggest the subject matter of claims 7, 10-12 and 29. Reconsideration and withdrawal of the rejection of claims 7, 10-12 and 29 under 35 U.S.C. 103(a) based on Applicant's Admission is requested.

Ogata et al. ( US 6,531,100)

Ogata et al. teaches a particular structure for supporting a photocatalyst. But, there is no teaching or disclosure of a structure of an air quality system in Ogata et al. Claim 9 on the other hand, because of its dependency on claim 1, defines a novel and unobvious air quality system, including a specific structure of an air quality system.

For the above reason, Applicant respectfully submits that Ogata et al. does not teach or fairly suggest the subject matter of claim 9. Reconsideration and withdrawal of the rejection of claim 9 under 35 U.S.C. 103(a) based on Ogata et al. is requested.

Mirowsky et al. ( US Patent Application no. 2003/0150222)

Mirowsky et al. discloses that an air treatment system may be useful in an aircraft and that air treatment may be facilitated with particular arrangements of ducts and air moving devices. In this reference, an ionic oxygen generator is disclosed as an operative air treatment unit. Mirowsky et al. is cited against claims 1, 26-28 and 30-32.

Independent claims 1 and 26 and their inventively distinguishable features are discussed above with respect to Say et al. Mirowsky et al. does not teach or suggest the inventive features of claims 1 and 26 either by itself or in combination with the other cited references. Indeed, Mirowsky et al. does not disclose any use of adsorbent units or photocatalytic oxidation units for air treatment. To the contrary, Mirowsky et al. discloses an entirely different air treatment mechanism, i.e., ionic oxygen generators. Furthermore, Mirowsky et

al. discloses air treatment with air flow ***parallel*** to air treatment units. The present invention as defined in claim 26 defines an ***orthogonal*** relationship between air flow and an air treatment unit. Consequently, there is no teaching or suggestion of the novel and unobvious sequenced arrangement of adsorbent units and photocatalytic oxidation units as defined in claims 1 and 26. Claims 27-28 and 30-32 because of their dependency on claim 26, also define a novel and unobvious air quality system.

For the above reasons, Applicants respectfully submit that Mirowsky et al does not teach or fairly suggest the subject matter of claims 1, 26-28 and 30-32. Reconsideration and withdrawal of the rejection of claims 1, 26-28 and 30-32 under 35 U.S.C. 103(a) based on Mirowsky et al. is requested.

#### CONCLUSION

Applicant again would like to thank the Examiner for taking the time to discuss the proposed amendments in a telephone interview. Reconsideration and withdrawal of the Office Action with respect to claims 1-4, 7, 9-13, 15-19, 26-32 and 64-65 is requested. Applicant submits that claims 1-4, 7, 9-13, 15-19, 26-32 and 64-65 are now in condition for allowance. Early notice to that end is earnestly solicited.

In the event that the examiner wishes to discuss any aspect of this response, please contact the attorney at the telephone number identified below.



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The Commissioner is hereby authorized to charge payment of any fees associated with this communication or credit any overpayment to Deposit Account No. 50-0851:

Respectfully submitted,

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